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Analysis and Speciation of Drinking Water in Some Areas Prevailing Chronic Kidney Disease of Unknown Etiology (CKDu) In Sri Lanka

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Abstract

Chronic Kidney Disease of Known etiology (CKDu) is a burning issue in the North Central Province of Sri Lanka over past 20 years. There are so many factors are been suspected such as heavy metals contamination and hardness of drinking water, toxins associated with cyanobacteria, fluoride toxicity, dehydration, etc. In those areas majority of CKDu patient's drinking water source is well-water. Drinking water samples were collected from Wewelketiya (40 samples) site in the Rambewa area. Those water samples were subjected to the analysis. Ca, Mg, Pb, Cd, Fe, Cr, F⁻, SO₄⁻², NO₃⁻, PO₄⁻³ concentrations were analysed. Speciation programme was run for Wewelketiya and Ampara as the reference area. Fluoride toxicity and the accumulation of Cd in the renal tubes may be a significant risk factor for the disease. Hence Cd and Fluoride analysis were highly considered. According to the results Cadmium and Fluoride concentrations in the endemic area of CKD have been exceeded than permissible level according to Sri Lanka standards, But not in the reference area. Average Cd concentration in the endemic area was 3.99 ppb (±2.87) while reference area reported as 0.15 ppb (±0.07). The average Fluoride content in endemic the area was 1.32 ppm (±0.73) and in the reference area it was 0.44 ppm (±0.24). However As and Pb concentrations were reported below the SLS permissible limit in the both areas. Hence fluoride toxicity and the accumulation of Cd in the renal tubes may be a significant risk factor for the disease. Lower concentrations of Ca and Mg were reported in the drinking water in the both of the endemic area and the reference area. According to the speciation results Calcium, Magnesium, Cadmium and Fluoride species tend to exist as free ionic species as Ca⁺², Mg⁺², Cd⁺² and F⁻. In addition to Fluoride other anions such as SO₄⁻², NO₃⁻, PO₄⁻³ were not exceeding the tolerance limit for drinking water. According to the results of drinking water analysis, people's drinking water sources can be a very significant reason for the prevalence of the CKDu in the CKD endemic areas.

Keywords: Chronic Kidney Disease, North central province, Speciation